How much does breath acetone vary between individuals during fasting?

Breath acetone variability in fasting

Breath acetone rises with fasting, but absolute levels differ a lot between people. Studies quantify both how wide this spread is across individuals and how much a single person varies from day to day.

Between-person variability in fasting

- In a large study of 215 overnight-fasted healthy adults, breath acetone ranged from **177 to 2,441 ppb** (≈0.18–2.4 ppm), a ~14-fold spread, with a geometric mean of 628 ppb (Schwarz et al., 2009).
- Within this fasted group, there was **no significant difference by sex**, and only a slight age-related increase in women; BMI was not correlated with levels (Schwarz et al., 2009).
- Children (5–11 years) had lower fasting acetone, median 263 ppb, significantly below adults (Schwarz et al., 2009).
- Other work also highlights **high inter-individual variability** in "fasting" or baseline acetone even in ostensibly similar healthy or diabetic populations (Anderson, 2015; Ruzsányi & Kalapos, 2017; Göschke & Lauffenburger, 1975).

Fasting ranges reported in different studies

Population / setting	Fasting breath acetone range	Citations
Healthy adults, overnight fast	177–2,441 ppb	(Schwarz et al., 2009)
Healthy volunteers, 12–36 h fast	2.3–157 µg/L (rises with duration)	(Andrews et al., 2018; Smith et al., 1999)
Healthy non-dieting (reviewed)	~0.5–2.0 ppm typical	(Nagamine et al., 2022)
Type 2 diabetes, "fasting" samples	0.1–19.8 ppm	(Göschke & Lauffenburger, 1975)

FIGURE 1 Wide fasting breath acetone ranges across studies

Within-person variability under fasting conditions

- In an 8-person study, basal fasting breath acetone showed **between-subjects CV 36%** and **within-subject CV 32%** across repeated fasting test days, even with standardized protocols (Španěl et al., 2011).
- A review notes substantial **biological and diurnal variability** in breath acetone in healthy individuals, contributing to wide swings even without obvious changes in behavior (Anderson, 2015).
- Daily ketone measurements in free-living subjects (not purely fasting) fluctuated by **~44% for breath acetone** within a single day (VeronikaRuzsányi & PéterKalapos, 2017).

Conclusion

During fasting, breath acetone can differ by about an order of magnitude or more between individuals, even when age, sex, BMI, and basic conditions are controlled. Within a single person, repeated fasting measurements can still vary by ~30–40%, so trends over time are more informative than any one absolute value.

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